



*This telescope has been donated to the **Oshtemo Branch** of the
Kalamazoo Public Library by the
Kalamazoo Astronomical Society
As part of the *Library Telescope Program**

**Orion StarBlast 4.5" Telescope
INSTRUCTION MANUAL**

WARNING: NEVER look directly at the Sun through your telescope, finder scope, or binoculars - even for an instant - as permanent eye damage could result. Do not point the telescope at the Sun, as parts will melt! Children should use this telescope only with adult supervision.

*“Joy in looking and comprehending
is nature’s most beautiful gift.”
- Albert Einstein*

This telescope is supported and maintained by

The Kalamazoo Astronomical Society

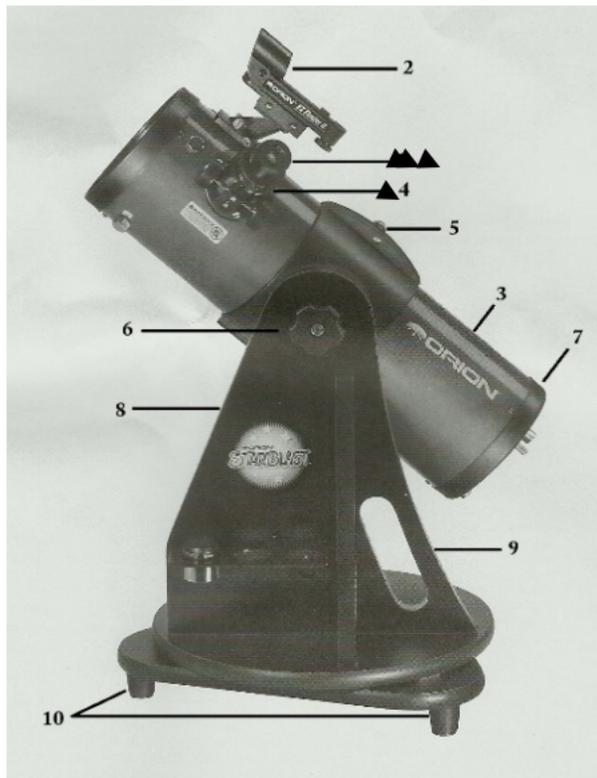
The KAS is a 501(c)(3) non-profit educational organization, the oldest of its kind in Michigan, and one of the largest. Our goal is to stimulate public interest in astronomy, and promote the exchange of information among those with a common interest in all areas of astronomy.

Visit kasonline.org/index.html for a list of events, information, and links to astronomy-related sites. We offer public observing sessions, presentations, demonstrations and discussions. New members are always welcome!

We invite you to join us under the stars at our free public observing sessions, weather permitting, at the Kalamazoo Nature Center in Kalamazoo, Mi.

kasonline.org/observing.html

We hope you gain a better understanding and appreciation of our universe through your experience with the telescope. Enjoy!!!



Telescope Parts

1. Eyepiece
2. EZ Finder
3. Optical Tube
4. Focuser
5. Tube Clamp
6. Altitude Knob
7. Mirror Cell (Don't Touch)
8. Support
9. Carrying Handle
10. Feet

EZ Finder Details



1. Focus Knobs

Transporting the telescope

The easiest way to transport the telescope is to place your forearm under the telescope tube when it is in a level position, and lift, holding the upright support against your side. When in a car, simply place the scope on a seat and use the seatbelt to secure it. The lap belt goes across the base, and the chest belt should cross the tube.

Getting Started

Please read the instructions and practice with the telescope during the day before you take it out in the dark. If you have questions or concerns regarding your telescope, please call your Oshtemo librarian at (269) 553-7992.

This is a manual telescope. Finding objects with this telescope is very easy. Turn the telescope towards the object you wish to see, looking along the top of the tube. Loosen the altitude knob enough to raise or lower the tube until you believe the object will be

able to be viewed in the eyepiece at low power. Make sure to tighten the altitude knob. Once you find what you are looking for, you can either watch the object move through your “field of view” (what you see through the eye piece) and then reposition the telescope, or keep pushing the scope to hold the object in the center of the eyepiece. Objects appear to move across the field of view faster at higher magnifications. This is because the field of view becomes narrower. You may find it helps to hold one hand near the carrying handle to steady it while moving and aiming the telescope.

Like all Newtonian reflector telescopes, the image in the eyepiece is upside-down. When looking at star charts or Moon maps, you will have to keep this in mind. Note that the Moon map on this telescope is “flipped” so it matches what you see in the eyepiece. This might not match your exact view since the orientation of the Moon varies depending on how you orient your body and the telescope in its mount.

Do You Wear Eyeglasses? If you wear eyeglasses, you will probably be able to observe with your glasses off by refocusing the telescope to your unaided vision. If your eyes are astigmatic, images will probably appear best with glasses on. This is because a

telescope's focuser can accommodate for nearsightedness or farsightedness, but not astigmatism.

This is important enough to say again:

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Focusing the Telescope

Always start by using your lowest-power (turn the body of the Zoom so the pointer is at “24”) to locate and center the object. Low magnification shows a larger area of sky in the eyepiece, making finding an object much easier.

With the eyepiece adjusted for low power (24 mm), aim the telescope in the general direction of an object at least 1/4-mile away. Use a steeple, telephone pole, or a chimney. Slowly rotate the focus knob until the object comes into sharp focus. Go a little bit

beyond sharp focus until the image starts to blur again, then reverse the rotation of the knob just to make sure you've hit the exact focus point.

Once you've centered an object in the eyepiece, you can switch to a higher magnification by twisting the Zoom's barrel, if you wish. This is recommended for small and bright objects, like planets and double stars. The Moon also takes higher magnifications well. You may have to refocus a little after changing power.

If you find that it's awkward to put your eye up to the eyepiece, you can rotate the tube by loosening the knob on the tube clamp and moving the optical tube until the focuser is in a convenient position. Be sure to tighten it again!

You may find that the optical tube is either too hard to move or does not stay in place. Use the altitude adjustment tension knob (it holds the telescope to the upright part of the base) to find the right level of tension.

Operating the EZ Finder

A "finder scope" helps you find things. It's like a sight on a rifle. The **EZ Finder** works by projecting a tiny red dot onto a lens mounted in the front of the unit, so that when you look through

the lens, the red dot will appear to float in space. Turn the power knob clockwise until you hear a “click” indicating that power is on.

With your eye positioned at a comfortable distance, look through the back of the EZ Finder with both eyes open to see the red dot. The intensity of the dot can be adjusted by turning the power knob. Use the dimmest possible setting that allows you to see the dot without difficulty. At the end of your observing session, be sure to turn the power knob counterclockwise until it clicks off. When the two white dots on the EZ Finder’s rail and power knob are lined up, the EZ Finder’s turned off.

Aligning the EZ Finder

When the EZ Finder is properly aligned with the telescope, an object that is centered on the EZ Finder’s red dot should also appear in the center of the field of view of the telescope’s eyepiece. Alignment of the EZ Finder is easiest during daylight. Aim the telescope at a distant object at least 1/4 mile away, such as the top of a telephone pole or chimney and center it in the telescope’s eyepiece. Now, turn the EZ Finder on and look through it. The object will appear in the field of view near the red dot. If the red dot is centered on the object in the eyepiece, you’re done!

If not: Without moving the telescope, use the EZ Finder's left/right (azimuth) and up/down (altitude) adjustment knobs to position the red dot on the object in the eyepiece.

When the red dot is centered on the distant object, *make sure* that the object is still centered in the telescope's eyepiece. If not, re-center the object in the eyepiece then center the Finder's red dot on the object. When the object is centered in the eyepiece and on the red dot, the Finder is properly aligned with the telescope.

The finder scope has a battery pack attached to the telescope, instead of the stock "button" battery. To change batteries, just slide the cover off the pack, and replace the two AAA batteries.

Fog on the mirrors and eyepieces: One of the odd things that happens when star gazing is that dew forms on pretty much everything (and everyone). The big mirror is tucked safely down at the bottom of the telescope, and so it does not get much dew on it. Eyepieces, however, often have dew form on them, making them useless until they warm up and dry out. A hair dryer or car window defroster often works well. Only use a plug-in hair dryer that has a Ground Fault Interrupt attached. Please don't wipe the lens with a

tissue or cloth. The eyepiece has special coatings on it that could be damaged if you do. Please ask people to not touch the lens... ever.

The image will be much better if you let the telescope cool down to air temperature before you start observing. This is because a difference in temperature between the mirror and surrounding air distorts the image. Ten or fifteen minutes should be sufficient.

The eyepiece chart on the telescope shows what magnification you will have for each setting of the zoom eyepiece. Change the zoom setting until your target fits the eyepiece the way you like. You may have to tweak the focus.

What to Expect

When looking at the sky with a telescope, planets will not look nearly as large as in NASA photos, but you might be able to see cloud bands on Jupiter or the rings of Saturn. Craters on the Moon will be clear and numerous, the waxing and waning of Venus should be visible, and many bright deep-sky objects will fill the eyepiece. Don't expect to see color as you do in NASA photos, as our eyes are not sensitive enough to see color in

deep-sky objects, except in a few of the brightest ones. Remember that you are seeing these objects using your own eyes! Each session with your telescope will be a learning experience. Each time you work with the telescope, it will get easier to use, and stellar objects will become easier to find.

Objects to Observe:

The Moon is one of the easiest and most interesting targets to view with your telescope. Lunar craters, “seas”, and even mountain ranges can all be clearly seen from a distance of 238,000 miles away! With its ever-changing phases, you’ll get a new view of the Moon every night it’s up. Make sure to observe the Moon when it is well above the horizon to get the sharpest image. The best time to observe is during a partial phase, that is, when the Moon is *not* full. Shadows are cast on the surface during partial phases. These shadows reveal more detail, especially near the border between the dark and light portions of the disk (called the “terminator”.) Use the Map on the telescope tube to find the major craters and features.

If the Moon is too bright or you want a bit more contrast, remove the small cap from the dust cap and place the dust cap on the end of the telescope. You may have to re-align the Finder with the telescope if you do this. See page 10 for instructions.

The Planets do not stay at “fixed” locations like the stars do. The word “planet” comes from a Greek word meaning “wanderer.” To find them you should refer to the Sky Calendar (telescope.com), or to charts published monthly in *Astronomy*, *Sky & Telescope*, or other astronomy magazines and web sites. If they are up, Venus, Jupiter, and Saturn are the brightest objects in the sky after the Sun and the Moon.

Stars: Even powerful telescopes cannot magnify a star to appear as more than a point of light. You can, however, enjoy the different colors of the stars and locate many pretty double stars and star clusters.

Look at the middle star in the handle of the Big Dipper, Mizar. It is really two stars very close together. Being able to see the two stars separate is called “Star Splitting”.

The gorgeous two-color double star, Albireo, in Cygnus is a favorite. Defocusing any star slightly can help bring out its color.

Deep-Sky Objects: Under dark skies, you can see many fascinating deep-sky objects, including nebulas, star clusters, and a variety of different types of galaxies.

Most deep-sky objects are very faint, so it is important that you find an observing site well away from light pollution. Please see the guide at the end of this manual for ideas and suggestions.

Take plenty of time to let your eyes adjust to the darkness. Do not expect these subjects to appear like the photographs you see in books and magazines; many will look like dim gray smudges. As you become more experienced and your observing skills get sharper, you will be able to discern more subtle details and structure.

Deep-Sky Objects, also referred to a “dim-fuzzes” are often hard to find at first. They are worth the effort, being some of most wonderful things in the night sky. To find deep-sky objects, look up the seasonal sky charts starting on page 34 of the National Audubon Society Constellations Pocket Guide, which is included with the telescope. Find your

season and a clear direction and match the stars with the chart, locating a constellation that is high in the sky. Use the lower cutout section on the *Constellations* guide to find that same constellation. Many constellations have numerous objects hidden within them that are only visible with a telescope or binoculars.

Pay particular attention to objects with an “M” number like The Orion Nebula (M-42) and the Andromeda Galaxy (M-31). These are some of many objects in Charles Messier’s catalog, which was first published in 1774 and includes 110 objects. Messier’s list includes some of the brightest and most attractive deep sky objects observable from the Northern Hemisphere.

Note that some Messier Objects are very faint, and will take more time to locate. A few are very dim, but may seem to appear like magic when you look at them “out of the corner of your eye.” Move your eye around and the object can come into view. This is called “Averted Vision” and works well when looking at very dim objects.

You can also try a low-power (24 mm) scanning of the Milky Way: just cruise through the “star clouds” of our galaxy. You’ll be amazed at the rich fields of stars and objects you’ll see!

Care and Maintenance

Store the telescope in a clean, dry, dust-free place that is safe from rapid temperature changes and humidity. Do not store the telescope outdoors. Please keep the dust covers on the telescope and eye piece when not in use.

Regarding cleaning the lenses or mirrors: Don't. If the lenses or mirrors appear dirty, please let your librarian know. The main mirror can become quite dusty before anyone would notice the image getting poor. Eyepieces, however, can get dirty fairly quickly, particularly when poked with fingers. DO NOT touch the eyepiece lens because the oils from your fingers WILL deteriorate the coatings. If the lens appears dirty, DO NOT try to clean it yourself! Let your librarian know immediately and she or he will have it cleaned. It is very easy to scratch the coatings on the lenses!

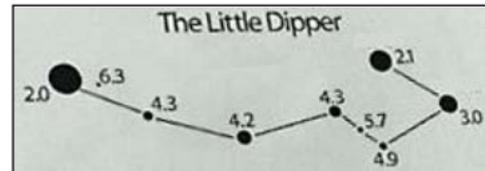
Aligning the Mirrors: Again, please don't. If it seems that the telescope is in need of adjustment, please tell your librarian.

When to go observing:

Seeing and Transparency: Atmospheric conditions vary significantly from night to night. “Seeing” refers to the steadiness of the Earth’s atmosphere at a given time. In conditions of poor seeing, atmospheric turbulence causes objects viewed through the telescope to “boil.”

In conditions of good seeing, star twinkling is minimal and images appear steady in the eyepiece. Seeing is best directly overhead, as we are looking through the least amount of atmosphere, and worst at the horizon. Good “transparency” is especially important for observing faint objects. Transparency is judged by the magnitude of the faintest stars you can see with the unaided eye (Mag. 1 is very bright, 2 is dimmer, and so on... 4th magnitude or fainter is desirable.)

Looking at the Little Dipper will show you how good the viewing is. If you can see all the stars, you are doing pretty well. Be sure to wait until your eyes adapt to the dark.



Wait for a night with little or no clouds when the Moon is not up. Find a location that is away from streetlights and light pollution and give yourself about twenty minutes to adjust to the dark.

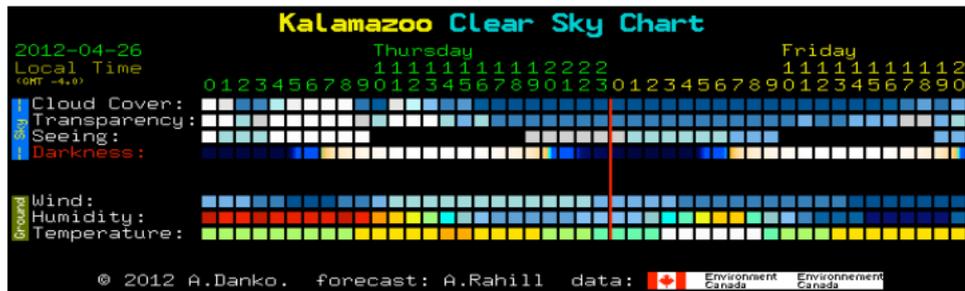
Take along a Sky Watching Kit:

- * Jacket and clothing to keep warm (very important in cold weather!)
- * A star chart or planisphere (see kasonline.org/index.html or skymaps.com)
- * An observing log to record your objects viewed
- * A chair and blanket
- * A table or box to put under the scope
- * Bug Dope (in season)
- * A friend or two
- * Munchies
- * Hot Chocolate or Coffee

Weather Conditions

A valuable resource is cleardarksky.com/esk. Here you will find the “Clear Sky Chart”. The chart is a time line for weather. If you click on the chart, you will find detailed explanations. For example, let’s use the Kalamazoo chart: cleardarksky.com/c/KalamaMOkey.html.

The first 4 bars are the most important: Is it cloudy? How clear is the sky? What is the “Seeing”, and finally, how dark is it? The deeper blue the squares are, the better. In this example Thursday is largely cloudy until 14:00 (military time.) Find the chart closest to your area.



Items included with the telescope

- Storage bag
- *Constellations National Audubon Society Pocket Guide*
- A red/white headlamp (use the red light when observing and white to pack up)
- Extra AAA batteries
- Orion Starblast 4.5 Instruction Manual (this Manual)
- Moon User's Guide
- Stellarium Planetarium Software
- A Compass

Notes:

The finder scope has a battery pack attached to the telescope. To change batteries, just slide the cover off the pack, and replace the two batteries. If the wires become detached, please let your librarian know ASAP.

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Looking up since 1936

The KAS would appreciate feedback on your experience with the telescope and the program. Please send any comments or suggestions titled “Library Telescope Program” to:

Mike Cook
Volleys2@aol.com

Daniel Flanigan
dan@danflanphoto.com

Rich Mather
rlm512@yahoo.com

Please take a moment to phone your Oshtemo librarians @ (269)553-7992 to thank them for the opportunity to view our beautiful universe!!! We hope you had a wonderful experience!

Special thanks to the New Hampshire Astronomical Society and Marc Stowbridge for creating such a wonderful program and making all of this possible! Visit ltp.2012@nhastro.com to let him know you enjoyed the program!

Kalamazoo Astronomical Society Library Telescope Manual

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